A COMPARATIVE STUDY TO ASSESS THE GROWTH AND DEVELOPMENT AMONG INFANTS OF THE MOTHERS DIAGNOSED AS GESTATIONAL DIABETES MELLITUS VERSUS PREGNANCY INDUCED HYPERTENSION DURING ANTENATAL PERIOD AT SELECTED HOSPITAL, PUDUCHERRY

SYNOPSIS OF THE THESIS

Submitted by

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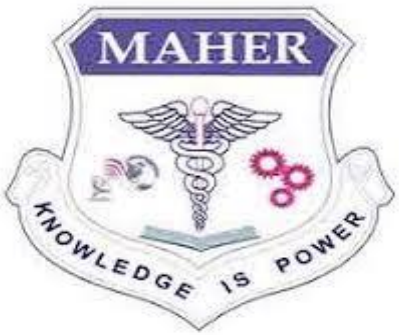
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY



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BONAFIDE CERTIFICATE

Certified that this Synopsis of the Thesis titled "**A COMPARATIVE STUDY TO ASSESS THE GROWTH AND DEVELOPMENT AMONG INFANTS OF THE MOTHERS DIAGNOSED AS GESTATIONAL DIABETES MELLITUS VERSUS PREGNANCY INDUCED HYPERTENSION DURING ANTENATAL PERIOD AT SELECTED HOSPITAL,PUDUCHERRY**" is the bonafide of **Mrs.T.BARANI** who carried out the research under my supervision. Certified further, that to the best of my knowledge the work reported here in does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other scholar.

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I. INTRODUCTION

“Please don't wait until the doctors tell you that you are going to have a baby to begin to take care of it. It is already there. Whatever you are, whatever you do, your baby will get it. Anything you eat, any worries that are on your mind will be for him or her.

ThíchNhấtHạnh.

Maternal health conditions are leading causes of death and disability among women. More than 99 per cent of the estimated 5,36,000 maternal deaths each year occur in the developing world (WHO, 2013). Every year, about 10 million women endure life-threatening complications during pregnancy and child birth, sometimes leading to long term disability.

1.1 Need of the Study

Maternal health during pregnancy is of utmost importance as it influences the way in which the unborn child is programmed for future life outside the womb, besides leading to an uneventful pregnancy and safe motherhood. Mounting evidence shows that prenatal and early life development influence the risks of Non-Communicable Diseases (NCD) in later life.

With the multitude of the common complications which jeopardize the maternal health during pregnancy, diabetes and hypertension are most important.In 2010, there was an estimated 143 million women with diabetes. By 2030, this number is expected to rise to 222 million. Diabetes is the ninth leading cause of death in women globally, causing 2.1 million deaths per year.

Two out of every five women with diabetes are of reproductive age, accounting for over 60 million women worldwide (World Diabetes Foundation, 2009). Over the next 2-3 decades there will be 80 million reproductive age women with diabetes in the world. Recent data show that GDM prevalence has increased by 10-100% in several race/ethnicity groups during the past 20 years (International Diabetes Federation 2013).

Table 1.1 - Prevalence of Gestational diabetes according to ethnicity

Place	GDM prevalence
India	16.7
Anglo – Celtic	3.0
Chinese	15
Arabic	7.3
Vietnamese	9.6
Aboriginal	10.1

Hypertensive disorders are common complication occurring during pregnancy responsible for maternal and fetal mortality and morbidity. World Health Organization estimates that at least one woman dies every seven minutes from complications of hypertensive disorders of pregnancy. As the Ethiopian Demographic Health survey (EDHS) 2016 reported, maternal mortality ratio is 412 deaths per 100,000 live births, and pregnancy induced hypertension has a countless role for this maternal death.

Pregnancies complicated with hypertensive disorders are associated with increased risk of adverse fetal, neonatal and maternal outcome including preterm birth, intrauterine growth retardation (IUGR), perinatal death, ante partum haemorrhage, postpartum haemorrhage and maternal death.Prevalence of PIH during pregnancy for the most recent live birth among women aged 15-49 years (n=39,657) who had a live birth in the five years preceding the survey, by state and residence, India, 2005-06 was depicted in the below table 1.2

Table 1.2: Prevalence of PIH in India (2005-06)

	Pre-eclampsia					
	Urban		Rural		Total	
India/States	N	(%)	N	(%)	N	(%)
India	5738	54.0	16323	56.2	22,061	55.6
Northern region						
Delhi	403	50.2	30	43.5	433	49.7
Haryana	88	37.3	201	31.8	289	33.3
Himachal Pradesh	36	47.4	313	46.9	349	46.9
Jammu and Kashmir	113	58.5	402	58.2	515	58.3
Punjab	197	56.4	306	52.8	503	54.1
Rajasthan	207	67.2	496	45.3	703	50.1
Uttaranchal	145	67.1	467	71.2	612	70.2
Central region						
Chhattisgarh	127	59.3	501	50.9	628	52.4
Madhya Pradesh	327	59.8	1027	59.8	1354	59.8
Uttar Pradesh	529	51.4	2110	53.8	2639	53.3
Eastern region						
Bihar	150	75.4	1143	77.8	1293	77.5
Jharkhand	150	64.1	748	77.4	898	74.8
Orissa	106	52.2	679	58.9	785	57.9
West Bengal	297	63.7	1015	63.4	1312	63.5
Northeastern region						
Arunachal Pradesh	121	75.6	275	63.4	396	66.7
Assam	85	52.5	641	58.1	726	57.4
Manipur	161	36.7	426	41.3	587	39.9
Meghalaya	99	68.8	399	59.4	498	61.0
Mizoram	203	70.5	201	63.6	404	66.9
Nagaland	167	50.0	535	49.0	702	49.2
Sikkim	54	59.3	306	67.4	360	66.1
Tripura	73	89.0	383	87.2	456	87.5
Western region						
Goa	253	56.9	209	59.7	462	58.1
Gujarat	298	69.5	407	61.8	705	64.8
Maharashtra	531	46.1	435	33.6	966	39.5
Southern region						
Andhra Pradesh	208	36.7	426	36.3	634	36.4
Karnataka	231	38.0	355	36.9	586	37.3
Kerala	207	78.4	431	76.4	638	77.1
Tamil Nadu	290	47.4	346	48.7	636	48.1

1.2 Title of the Study

1.3 Statement of the Problem

A comparative study to assess the growth and development among infants of the mothers diagnosed as Gestational Diabetes Mellitus Versus Pregnancy Induced Hypertension during antenatal period at selected hospitals Puducherry

1.4 Objectives

1. To assess the growth among infants of mothers diagnosed as GDM with regard to height, weight, head circumference and chest circumference.
2. To assess the development among infants of mothers diagnosed as GDM with regard to gross motor, language, fine motor adoptive, personal-social.
3. To assess the growth among infants of mothers diagnosed as PIH with regard to height, weight, head circumference and chest circumference.

4. To assess the development among infants of mothers diagnosed as PIH with regard to gross motor, language, fine motor adaptive and personal social.
5. To correlate the mean difference of the growth and development of infants of mothers diagnosed as GDM with growth and development of infants of mothers diagnosed as PIH.
6. To compare the growth and development among infants of mothers diagnosed as GDM and infants of mothers diagnosed as PIH.
7. To associate the growth and development of infants of mothers diagnosed as GDM and the mothers diagnosed as PIH with Socio demographic variables.

1.5 Hypotheses

- There is no significant difference among the growth of the mothers diagnosed as gestational diabetic mellitus during antenatal period.
- There is no significant difference among the growth of the mothers diagnosed as gestational diabetic mellitus during antenatal period.
- There is no significant difference among the development of the mothers diagnosed as gestational diabetic mellitus during antenatal period.
- There is no significant difference among the development of infants of the mothers diagnosed as pregnancy induced hypertension during antenatal period.
- There is no significant difference in growth among infants of mother with GDM and PIH with respect to selected socio-demographic variables.
- There is no significant difference in development among infants of mother with GDM and PIH with respect to selected socio-demographic variables.

1.6 Operational Definitions

- **Infants** -A child from one month to one year of age born to their mothers diagnosed as GDM or PIH during antenatal period.
- **Gestational Diabetes Mellitus** - Diabetes initially diagnosed during pregnancy due to glucose intolerance.
- **Pregnancy Induced Hypertension** - A Diagnostic Level used to describe the syndrome of Hypertension, edema & proteinuria evident in certain pregnant women
- **Assess** - To measure the growth by height, weight, head circumference and chest circumference and development of infants by personal-social, finemotor-adaptive, language and gross motor sectors.

- **Growth & development** - Increase in size and the functional maturation (mile stone)of the infants born to the mothers diagnosed as GDM or PIH during antenatal period.

1.7 Assumptions

- Mothers diagnosed as GDM Vs. PIH may think the growth and development of their infant will be normal.
- Mothers diagnosed as GDM and PIH is the common medical disorder that will affect the growth and development of their infant.

II. REVIEW OF LITERATURE

2.1 Literature Review

Dionne G (2013) explored a case-control longitudinal design with 2 birth cohorts and to compare infants of diabetic mothers and controls on language outcomes from ages 18 months to 7 years.Analyses revealed effects of gestational diabetes on expressive language at 18, 30 and 72/84 months. Infants of diabetic mothers scored 0.27 to 0.41 SD lower than controls and were 2.2 times more at risk of language impairment. Gestational diabetes hinders expressive language in offspring into middle childhood. Genes are strongly associated with the risk of delays in infants of diabetic mothers, and offspring of educated mothers are less affected.

Rima Irwinda et al (2016) investigate the impact of PIH on fetal growth.PIH women who had SGA or VLBL or LBW infants were caused by the hypoperfusion model as the pathogenesis of preeclampsia. Meanwhile, LGA infants born by preeclamptic women were due to the compensation of the decrease from uteroplacental perfusion or other diseases such as obese mother or gestational diabetes mellitus.

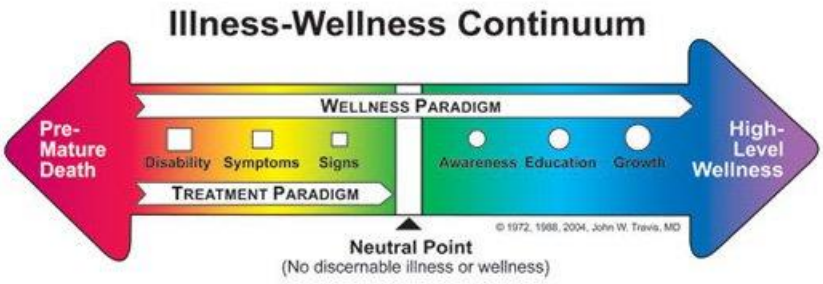
A population-based retrospective cohort study by Baulon, E. et al (2005) noted that infants born to mothers with PIH but without IUGR have normal early infant growth. The effect of PIH on early infant growth is dependent on whether or not a baby is intrauterine growth restricted. IUGR secondary to PIH is associated with significant catch-up growth in early infant period. Therefore, we speculate that IUGR babies born to mothers with PIH may be at higher risk to develop certain chronic diseases in their later life.

A major study conducted by researchers affiliated with the UC Davis MIND Institute has found strong links between maternal diabetes and obesity and the likelihood of having a child with autism spectrum disorder (ASD) or another developmental disorder.Mothers with diabetes were found to have nearly 67 percent more likely to have a child with developmental delays as healthy mothers. However, the proportion of mothers with diabetes who had a child with ASD was higher than in healthy moms but did not reach statistical significance.

A prospective analysis of 28,358 mother-infant pairs who enrolled in the National Collaborative Perinatal Project between 1959 and 1965 was conducted by Baptiste-Roberts,

K et al. (2012). The study concludes that the GDM is predictor of early childhood growth independent of birthweight. Therefore clinicians might focus on peri-conceptional interventions that prevent insulin sensitivity and the development of GDM. Current evidence indicates that physical activity prior and during pregnancy results in an almost 50% reduction in the development of GDM.

2.2Conceptual Framework



Travi's wellness model was adopted for this study. If GDM and PIH mothers take care of the health and their infants have normal growth and development. If not that leads to infants illness also.

III. METHODOLOGY

3.1 Research approach and design

Quantitative research with descriptive design , non-experimental method and comparative survey was used in this study.

3.2 Variables

3.2.1. Independent variable: Socio-demographic variables

3.2.2. Dependent variable: (a) Growth (Height, weight, head and chest circumference) (b) Development (gross motor, language, fine motor & personal-social motor)

3.3 Research Setting

The study was conducted in the maternity unit in Puducherry (St. Joseph Cluny hospital).

3.4 Population of the study

Infants of all mothers diagnosed as GDM and PIH during antenatal period in selected hospitals, Puducherry

3.5 Sample

Infants who fulfills the inclusion criteria and exclusion criteria

3.6 Criteria for sample selection

Inclusion criteria

- All Infants of mothers who has GDM during antenatal period.
- All infants within one month to one year presentational/ gestational/ Hypertension/ pregnancy induced hypertension.

Exclusion criteria

- Infant's mothers diagnosed with other infectious diseases during antenatal period.
- Infant's mothers with consanguineous marriage.
- Infant's mothers diagnosed with uterine anomalies during antenatal period.

3.7 Sampling technique

Non probability convenient sampling technique was used to select the samples.

3.8Process of sample collection

Infants of mothers diagnosed as Gestational diabetic mothers during antenatal period – 250 samples and Infants of mothers diagnosed as Pregnancy induced hypertension during antenatal period – 250 samples**. S**ample size was calculated by using poweranalysis.

3.9 Data collection instrument

Part I-Demographic variables (collected from mother)

- Age, Gender, Educational Qualification of father and mother, occupation of father and mother, type of family, religion, area of residence, family income, mother had GDM or PIH or Both During pregnancy period, no of children in the family, Mother - Pregestation/gestation/hypertension/PIH, Primi /multigravida, Induction of oxytocin, Mode of assisted deliveries-forceps/normal/LSCS /No.of visits/No. of NST, Newborn, APGAR and Birth weight/

Part II- Growth (Height, Weight, Head circumference & Chest circumference)

Part III – Development (Gross motor, Language, Fine motor adoptive& personal social)

- DDST is the most widely used test for screening developmental problems in children. Denver Scale is quick method to process large numbers of children in order to identify the delay in children.

3.10 Content Validity

Growth chart, Denver development screening test and socio demographic data were evaluated by experts in the field of pediatric department, pediatrician and from nursing department. The suggestions given by experts were incorporated and the tool was finalized.

3.11 Pilot Study

Considering all ethical aspects of the study the pilot study was conducted in the maternity unit in Puducherry (St. Joseph Cluny hospital). This was statistically proven that the comparative mean score of Growth and development of PIH mothers infants had mild variation than mean score GDMmothers infants growth and development. The pilot study results shows the tool was effective in assessing the growth and development of GDM and PIH mothers infants found to be feasible and practicable for conducting the main study.

3.12 Data collection procedure

Formal permission was obtained from the authority concern, IEC approval was taken. After that permission obtained from nursing superintendent and data collection was started with effect from 1st October 2015 to September 2016.Observational method used and the researcher observe the infants with the help of DDST scale.

IV. ANALYSIS AND INTERPRETATION

Data was analyzed by using both descriptive and inferential statistics. Number and percentage was used to analyze the demographic variables. Association between assessment on growth and development among infants of GDM & PIH mothers with respect to socio-demographic variables using chi-square.

Organization of data

Data was organized with following headings

Section A – Socio-Demographic variable among infants of the mothers diagnosed as Gestational Diabetes mellitus (GDM) and Pregnancy Induced Hypertension (PIH)

Section B – Assessment on growth and development among infants of the mothers diagnosed as Gestational Diabetes mellitus (GDM) and Pregnancy Induced Hypertension (PIH)

Section C – Assessment of growth and development among infants of the mothers diagnosed as Gestational Diabetes mellitus and Pregnancy Induced Hypertension with respect to socio-demographic variables

Section A

Table 4.1 Frequency and percentage wise distribution of selected demographic variable among infants of GMD and PIH mothers

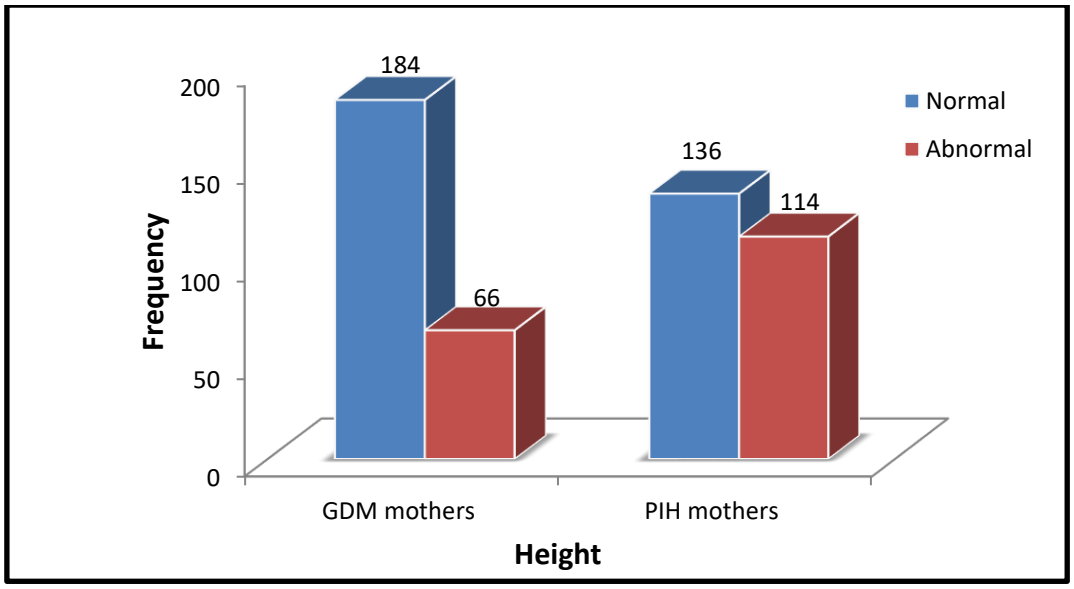
Socio-demographic variables	GDM mothers		PIH mothers	
	N	%	N	%
Age of the child				
1 month to 3 months	52	20.8	55	22.0
4 months to 6 months	71	28.4	78	31.2
7 months to 9 months	62	24.8	44	17.6
9 months to 12 months	65	26.0	73	29.2
Sex				
Male	84	33.6	83	33.2
Female	166	66.4	167	66.8
Education of the father				
Uneducated	35	14.0	85	34.0
Primary	48	19.2	103	41.2
Secondary	73	29.2	54	21.6
Graduate	85	34.0	8	3.2
Post graduate & any other	9	03.6	0	0
Education of the mother				
Uneducated	49	19.6	77	30.8
Primary	156	62.4	120	48.0

Secondary	31	12.4	44	17.6
Graduate	14	5.6	9	3.6
Post graduate & any other	0	0	0	0
Occupation of the father				
Employed	89	35.6	89	35.6
Self-employed	78	31.2	116	46.6
Daily wages	83	33.2	45	18.0
Occupation of the mother				
Employed	31	12.4	30	12.0
Self-employed	22	08.8	28	11.2
Daily wages	46	18.4	41	16.4
Homemaker	151	60.4	151	60.4
Type of family				
Nuclear	77	30.8	147	58.8
Joint	173	69.2	103	41.2
Area of residence				
Rural	115	46.0	86	34.4
Urban	135	54.0	164	65.6
Religion				
Hindu	114	45.6	114	45.6
Muslim	78	31.2	98	39.2
Christian	48	19.2	38	15.2
Any others	10	4.0	0	0
Family monthly income				
Below Rs.5000	89	35.6	101	40.4
Rs.5001 to Rs.10000	111	44.4	105	42.0
Above Rs.10000	50	20.0	44	17.6
Mother was on				
Regular treatment during pregnancy	87	34.8	94	37.6
Not an regular treatment during pregnancy	117	46.8	106	42.4
On irregular treatment	46	18.4	50	20.0
Mother				
Primigravida	233	89.2	227	90.8
Multigravida	27	10.8	23	9.2
Mode of delivery				
Normal Vaginal delivery	167	66.8	173	69.2
LSCS	83	33.2	77	30.8
Infant				
Immunized as per schedule	197	78.8	140	56.0
Not immunized as per schedule	53	21.2	110	44.0

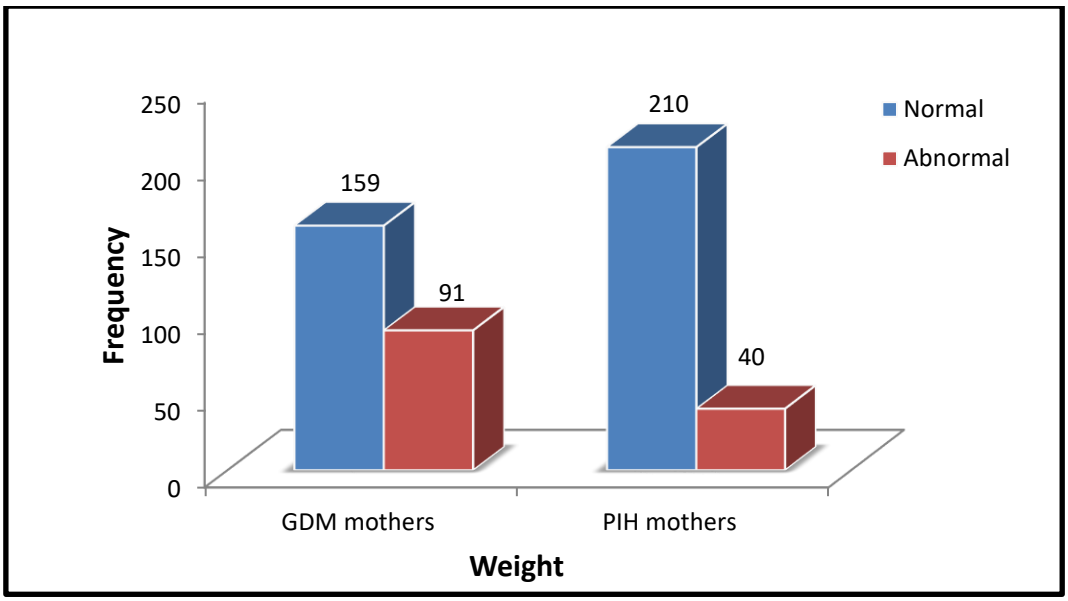
- It was observed that highest percentage of Infants were in the age group of 4 months to 6 months (GDM=28.4% and PIH=33.2%) respectively.
- Both the group I&II comprises of more number of female infants (GDM=66.4 and PIH=66.8) when compared with male infants.
- Regarding the family background of study samples, more than 45 percent of GDM mothers' Infants as well as PIH mothers' infants were from Hindu religion.
- Majority of GDM mothers' infants (69.2%) were from joint family while most of the PIH mothers' infants (58.8%) were from nuclear family than their respective counterparts.
- Highest percentage of GDM mothers' infants (44.4%) as well as PIH mothers' infants (42%) were from families with monthly income range of Rs. 5001 to 10000.
- About the mothers of education and occupation, Majority of infants GDM mothers (62.4%& 60.4%) and PIH mothers (48% & 60.4%) were completed only Primary education and seems to be homemaker.
- With regard to number of times the mothers became pregnant, most of the mothers observed under primigravida (GDM=89.2%; PIH=90.8%). Further, type of delivery and immunization schedule also depicted in the table, normal vaginal delivery (GDM=66.8%; PIH=69.2%) and immunized their infant as per proper schedule (GDM=78.8%; PIH=56.0%)

Table 4.2: Frequency and percentage wise distribution of assessment of growth by self-observational tool among infants of GMD and PIH mothers

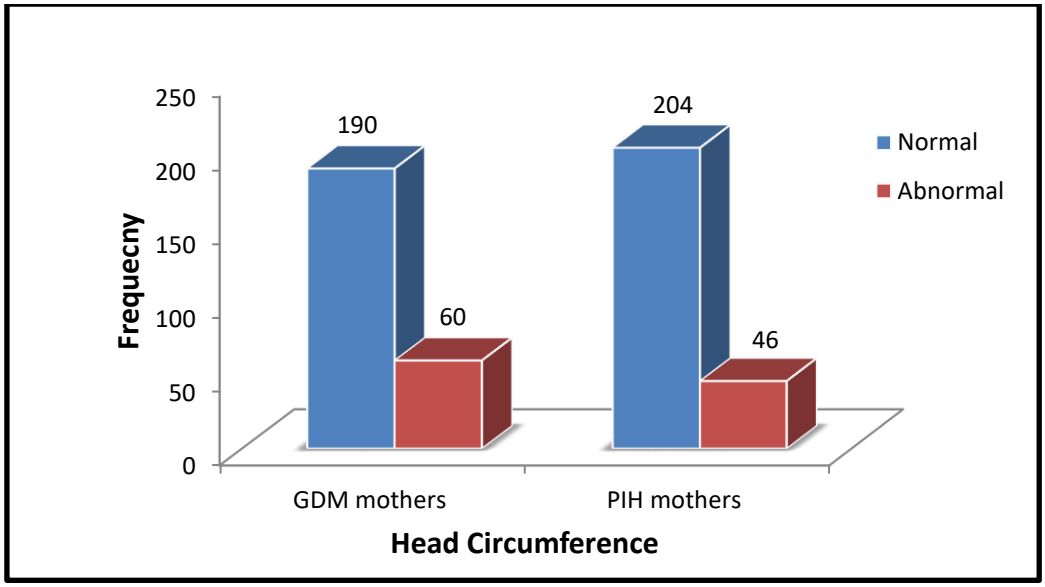
Self - Observational Tool	GDM mothers (N=250)		PIH mothers (N=250)		GDM mothers (N=250)		PIH mothers (N=250)	
	Normal				Abnormal			
	N	%	N	%	N	%	N	%
Height	184	73.6	136	54.4	66	26.4	114	45.6
Weight	159	63.6	210	84	91	36.4	40	16
Head circumference	190	76	204	81.6	60	24	46	18.4
Chest circumference	159	63.6	209	83.6	91	36.4	41	16.4

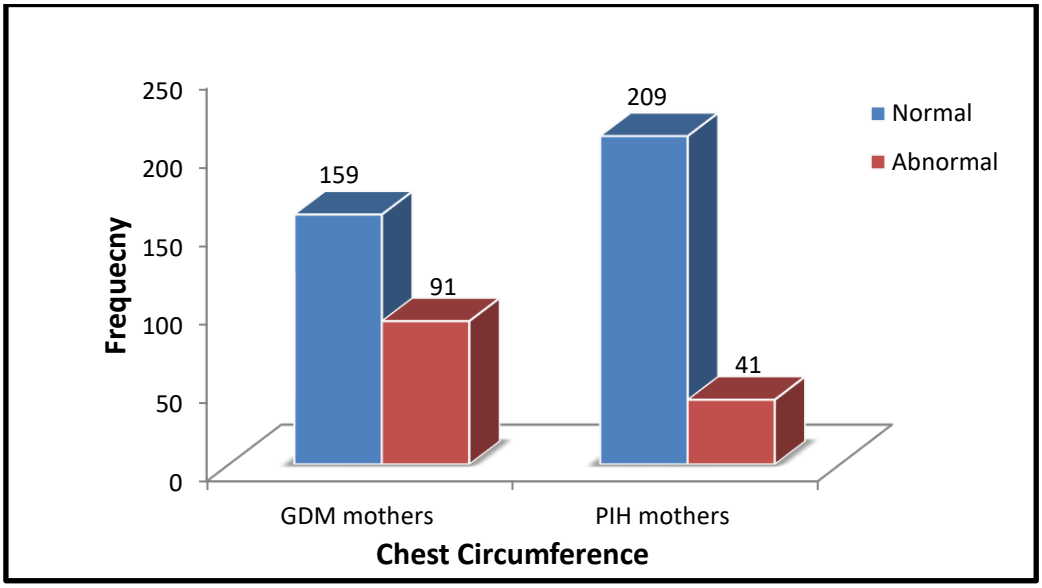


- Regarding the self-observational tools, infant's height of GDM mothers were higher (73.6%) when compared with infants of PIH mothers (54.4%).



- In contrary weight of PIH mothers seems to be increased (84%) whereas among infants of GDM mothers is slightly lesser (63.3%).

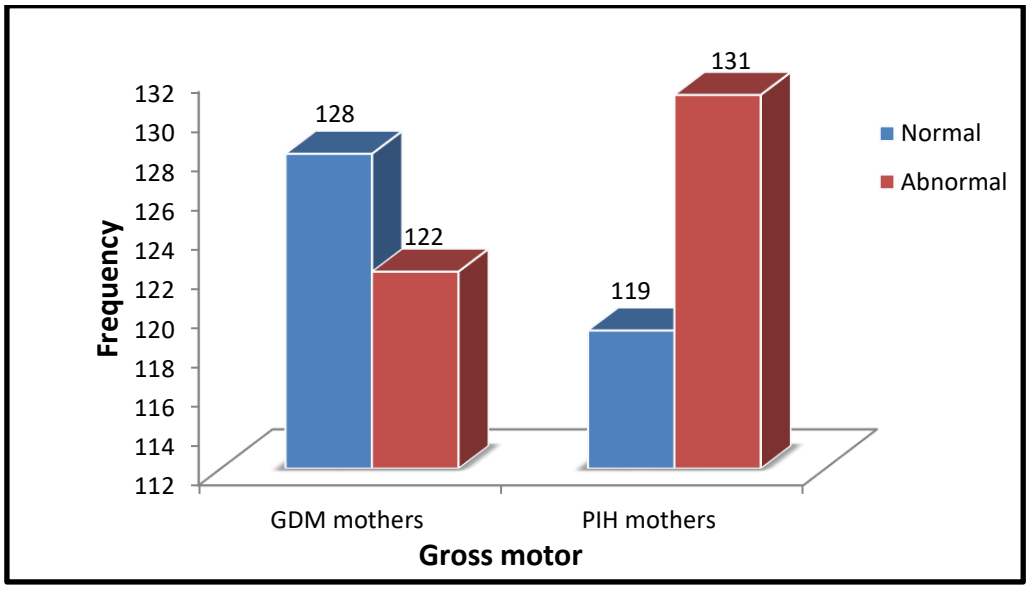


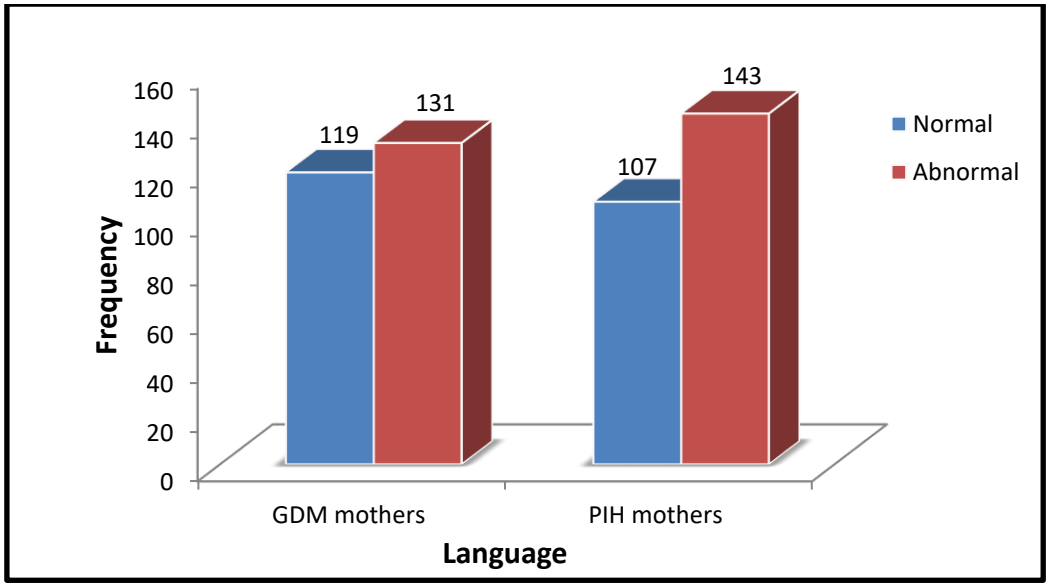


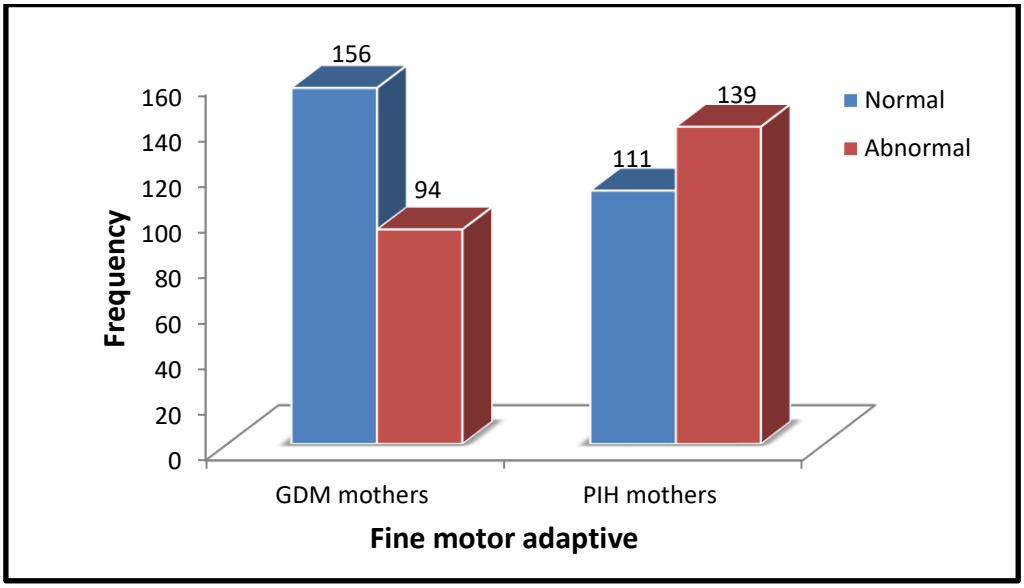
- Similarly, head and chest circumference were also higher among infants of PIH mothers (81.6% & 83.6%) than GDM mothers (76% & 63.6%).

Table 4.3: Frequency and Percentage wise distribution of assessment of development by Denver Development Screening Test Scale among infants of GDM and PIH mothers

Denver Development Screening Test Scale	GDM mothers				PIH mothers			
	Normal		Abnormal		Normal		Abnormal	
	N	%	N	%	N	%	N	%
Gross motor	128	51.2	122	48.8	119	47.6	131	52.4
Language	119	47.6	131	52.4	107	42.8	143	57.2
Fine motor adaptive	156	62.4	94	37.6	111	44.4	139	55.6
Personal –social	109	43.6	141	56.4	123	49.2	127	50.8




160
140
120
100
80
60
40
20
0
Frequency
119
131
107
143
Normal
Abnormal
GDM mothers
PIH mothers
Language


160
140
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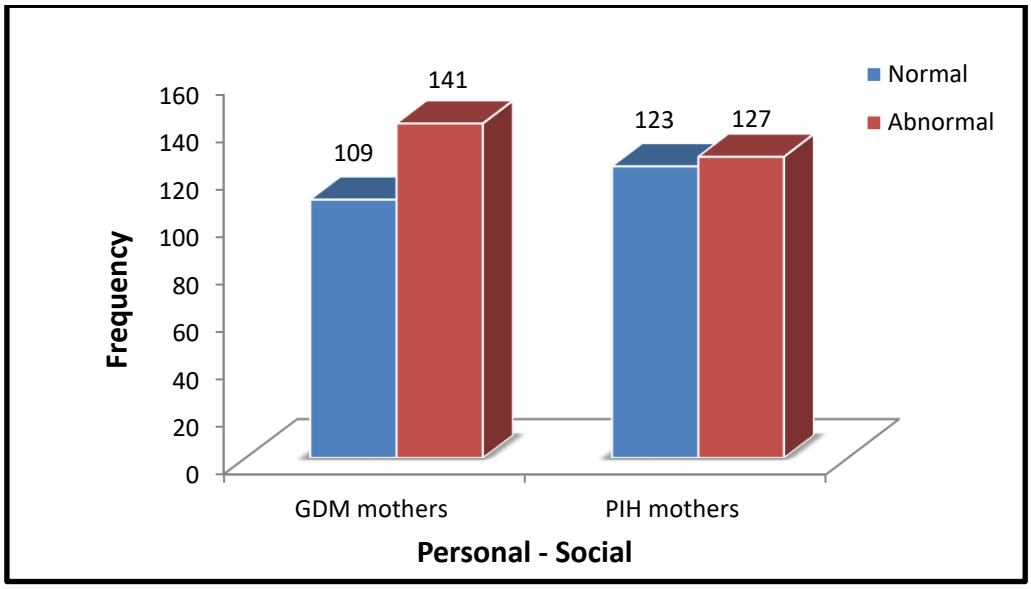
Frequency
156
94
111
139
Normal
Abnormal
GDM mothers
PIH mothers
Fine motor adaptive



Regarding the Denver development screening test scale, all the parameters viz… gross motor, language, fine motor adaptive and personal-social, infants of GDM mothers had less when compared with infants of PIH mothers (48.5%, 52.4%, 37.6% and 56.4% Vs 52.4%, 57.2%, 55.6% and 50.8%).

Table 4.4: Association between assessment of HEIGHT among infants of GDM & PIH mothers with respect to socio-demographic variables using chi-square

Demographic variables	HEIGHT									
	GDM mothers					PIH mothers				
	Normal Growth		Abnormal Growth		$\chi 2$, p value	Normal Growth		Abnormal Growth		$\chi 2$, p value
	N	%	N	%		N	%	N	%	
Sex										
Male	56	66.7	28	33.3	3.13, 0.054*	27	32.5	56	67.5	23.9, 0.000*
Female	128	77.1	38	22.9		109	65.3	58	34.7	
Education of the father										
Uneducated	18	51.4	17	48.6	12.3, 0.015*	54	63.5	31	36.5	12.9, 0.006NS
Primary	35	72.9	13	27.1		57	55.3	46	44.7	
Secondary	54	74	19	26		19	35.2	35	64.8	
Graduate	70	82.4	15	17.6		6	75	2	25	
Post graduate & any other	7	77.8	2	22.2		0	0	0	0	
Education of the mother										
Uneducated	38	77.6	11	22.4	9.0, 0.029*	43	55.8	34	44.2	9.0, 0.029*
Primary	120	76.9	36	23.1		73	60.8	47	39.2	
Secondary	16	51.6	15	48.4		18	40.9	26	59.1	
Graduate	10	71.4	4	28.6		2	22.2	7	77.8	
Post graduate & any other	0	0	0	0		0	0	0	0	
Area of residence										
Rural	100	87	15	13	19.5, 0.000*	72	83.7	14	16.3	45.4, 0.000*
Urban	84	62.2	51	37.8		64	39	100	61	
Family monthly income										
Below Rs.5000	74	83.1	15	16.9	6.68, 0.035*	53	52.5	48	47.5	1.07, 585^{NS}
Rs.5001 to Rs.10000	77	69.4	34	30.6		61	58.1	44	41.9	
Above Rs.10000	33	66	17	34		22	50	22	50	
Mode of delivery										
Normal Vaginal delivery	109	32.5	56	67.5	23.9, 0.000*	122	70.5	51	29.5	9.0, 0.000*
LSCS	27	65.3	58	34.7		62	80.5	15	19.5	
Infant										
Immunized as per schedule	173	87.8	24	12.2	96.6, 0.000*	94	67.1	46	32.9	20.8, 0.000*
Not immunized as per schedule	11	20.8	42	79.2		42	38.2	68	61.8	

Table 4.5: Association between assessment of WEIGHT among infants of GDM & PIH mothers with respect to socio-demographic variables using chi-square

Demographic variables	WEIGHT									
	GDM mothers					PIH mothers				
	Normal Growth		Abnormal Growth		$\chi 2$, p value	Normal Growth		Abnormal Growth		$\chi 2$, p value
	N	%	N	%		N	%	N	%	
Sex										
Male	62	73.8	22	26.2	5.96, 0.012*	67	80.7	16	19.3	0.99, 0.207^{NS}
Female	97	58.4	69	41.6		143	85.6	24	14.4	
Fathers occupation										
Employed	62	69.7	27	30.3	9.08 0.011*	75	84.3	14	15.7	3.7, 0.988^{NS}
Self-employed	55	70.5	23	29.5		97	83.6	19	16.4	
Daily wages	42	50.6	41	49.4		38	84.4	7	15.6	
Area of residence										
Rural	104	90.4	11	9.6	66.2 0.000*	80	93	6	7	7.94, 0.003*
Urban	55	40.7	80	59.3		130	79.3	34	20.7	
Mother										
Primigravida	159	71.3	64	28.7	52.8, 0.000*	208	91.6	19	8.4	106.8, 0.000*
Multigravida	0	0	27	100		2	8.7	21	91.3	
Mode of delivery										
Normal Vaginal delivery	109	32.5	56	67.5	20.2, 0.000*	122	70.5	51	29.5	22.3, 0.000*
LSCS	27	65.3	58	34.7		62	80.5	15	19.5	

According to chi-square test, a significant difference was observed between height and weight among infants of GDM mothers and PIH mothers with selected socio-demographic variables like gender, mother's education, place of residence, family income, mode of delivery and immunization schedule.

Table 4.6: Association between assessment of GROSS MOTOR among infants of GDM & PIH mothers with respect to socio-demographic variables using chi-square

Demographic variables	GROSS MOTOR									
	GDM mothers					PIH mothers				
	Normal		Abnormal		$\chi 2$, p value	Normal		Abnormal		$\chi 2$, p value
	N	%	N	%		N	%	N	%	
Sex										
Male	65	77.4	18	21.4	38.0, 0.000*	51	61.4	23	27.7	11.8, 0.003*
Female	63	38	70	42.2		68	40.7	84	50.3	
Education of the Father										
Uneducated	16	45.7	12	34.3	13.9, 0.083^{NS}	37	43.5	41	48.2	15.0, 0.019*
Primary	25	52.1	21	43.8		42	40.8	47	45.6	
Secondary	46	63	18	24.7		37	68.5	14	25.9	
Graduate	39	45.9	32	37.6		3	37.5	5	62.5	
Post graduate & any other	2	22.2	5	55.6		0	0	0	0	
Education of the mother										
Uneducated	23	46.9	18	36.7	18.9, 0.004*	34	44.2	35	45.5	7.87, 0.247^{NS}
Primary	71	45.5	59	37.8		55	45.8	50	41.7	
Secondary	26	83.9	5	16.1		24	54.5	20	45.5	
Graduate	8	57.1	6	42.9		6	66.7	2	22.2	
Post graduate & any other	0	0	0	0		0	0	0	0	
Family monthly income										
Below Rs.5000	85	95.5	4	4.5	273, 0.000*	70	69.3	27	26.7	84.1, 0.000*
Rs.5001 to Rs.10000	29	26.1	82	73.9		34	32.4	68	64.8	
Above Rs.10000	14	28	2	4		15	34.1	12	27.3	

Table 4.7: Association between assessment of LANGUAGE among infants of GDM & PIH mothers with respect to socio-demographic variables using chi-square

Demographic variables	LANGUAGE									
	GDM mothers					PIH mothers				
	Normal		Abnormal		χ2 , p value	Normal		Abnormal		χ2 , p value
	N	%	N	%		N	%	N	%	
Sex										
Male	61	72.6	22	26.2	36.14, 0.000*	41	49.4	33	39.8	3.06, 0.216 NS
Female	58	34.9	75	45.2		66	39.5	86	51.5	
Education of the mother										
Uneducated	22	44.9	19	38.8	17.02, 0.009 NS	30	39	39	50.6	7.16, 0.306NS
Primary	66	42.3	64	41		51	42.5	54	45	
Secondary	24	77.4	7	22.6		23	52.3	21	47.7	
Graduate	7	50	7	50		3	33.3	5	55.6	
Post graduate & any other	0	0	0	0		0	0	0	0	
Family monthly income										
Below Rs.5000	80	89.9	9	10.1	261.5, 0.000*	64	63.4	33	32.7	80.4, 0.000*
Rs.5001 to Rs.10000	26	23.4	85	76.6		30	28.6	72	68.6	
Above Rs.10000	13	26	3	6		13	29.5	14	31.8	
Mode of delivery										
Normal Vaginal delivery	88	50.9	64	37	0.552, 0.328NS	35	40.7	40	46.5	20.3, 0.000*
LSCS	31	40.3	33	42.9		72	43.9	79	48.2	

Regarding the gross motor and language development among infants of GDM mothers, a significant difference was found with respect to gender, mother's education and family income.

Table 4.8: Association between assessment of Head circumference among infants of GDM & PIH mothers with respect to socio-demographic variables using chi-square

Demographic variables	HEAD CIRCUMFERENCE									
	GDM mothers					PIH mothers				
	Normal Growth		Abnormal Growth		χ^2 , p value	Normal Growth		Abnormal Growth		χ^2 , p value
	N	%	N	%		N	%	N	%	
Sex										
Male	62	73.8	22	26.2	0.333, 0.335 NS	67	80.7	16	19.3	0.064, 0.464 NS
Female	128	77.1	38	22.9		137	82	30	18	
Education of the father										
Uneducated	23	65.7	12	34.3	4.83, 0.304 NS	70	82.4	15	17.6	7.97, 0.047*
Primary	34	70.8	14	29.2		79	76.7	24	23.3	
Secondary	59	80.8	14	19.2		50	92.6	4	7.4	
Graduate	68	80	17	20		5	62.5	3	37.5	
Post graduate & any other	6	66.7	3	33.3		0	0	0	0	
Father occupation										
Employed	62	69.7	27	30.3	3.59, 0.166 NS	69	77.5	20	22.5	2.58, 0.275 NS
Self-employed	60	76.9	18	23.1		95	81.9	21	18.1	
Daily wages	68	81.9	15	18.1		40	88.9	5	11.1	
Mode of delivery										
Normal	109	32.5	56	67.5	20.1, 0.003*	122	70.5	51	29.5	5.04, 0.000*
LSCS	27	65.3	58	34.7		62	80.5	15	19.5	

Table 4.9: Association between assessment of chest circumference among infants of GDM & PIH mothers with respect to socio-demographic variables using chi-square

Demographic variables	CHEST CIRCUMFERENCE									
	GDM mothers					PIH mothers				
	Normal Growth		Abnormal Growth		χ^2, p value	Normal Growth		Abnormal Growth		χ^2, p value
	N	%	N	%		N	%	N	%	
Sex										
Male	62	73.8	22	26.2	5.69, 0.012*	67	80.7	16	19.3	0.750, 0.245 NS
Female	97	58.4	69	41.6		142	85	25	15	
Area of residence										
Rural	104	90.4	11	9.6	66.2 0.000*	80	93	6	7	8.48 0.002*
Urban	55	40.7	80	59.3		129	78.7	35	21.3	
Mother										
Primigravida	159	71.3	64	28.7	52.8, 0.000*	209	9.1	18	7.9	129.1 0.000*
Multigravida	0	0	27	100		0	0	23	100	
Mode of delivery										
Normal	109	32.5	56	67.5	25.2, 0.000*	122	70.5	51	29.5	18.3 0.001*
LSCS	27	65.3	58	34.7		62	80.5	15	19.5	

Among infants of PIH mothers, a significant difference was observed between head circumference with respect to father's education and mode of delivery but among GDM mothers no difference was found with socio demographic variables except mode of delivery. Regarding chest circumference, variables like gender, area of residence, number of times of pregnancy and mode of delivery was significantly different when compared with their counterparts in both GDM and PIH mothers.

Table 4.10: Association between assessment of FINE MOTOR ADAPTIVE among infants of GDM & PIH mothers with respect to socio-demographic variables using chi-square

Demographic variables	PHYSICAL-SOCIAL									
	GDM mothers					PIH mothers				
	Normal		Abnormal		$\chi 2$, p value	Normal		Abnormal		$\chi 2$, p value
	N	%	N	%		N	%	N	%	
Sex										
Male	32	38.1	37	44	1.56, 0.456 NS	33	39.8	39	47	4.56 0.102 NS
Female	77	46.4	64	38.6		90	53.9	58	34.7	
Occupation of the mother										
Employed	11	35.5	13	41.9	4.08 0.665 NS	12	40	16	53.3	7.11, 0.001*
Self-employed	8	36.4	10	45.5		15	53.6	10	35.7	
Daily wages	17	37	21	45.7		18	43.9	20	48.8	
Homemaker	73	48.3	57	37.7		78	51.7	51	33.8	
Mother										
Primigravida	96	43	94	42.2	3.57 0.167 NS	115	50.7	89	39.2	8.34 0.15*
Multigravida	13	48.1	7	25.9		8	34.8	8	34.8	
Family Income										
Below Rs.5000	41	46.1	32	36	11.4 0.022*	48	47.5	44	43.6	3.42 0.489*
Rs.5001 to Rs.10000	38	34.2	52	46.8		54	51.4	38	36.2	
Above Rs.10000	30	60	17	34		21	47.7	15	34.1	

Table 4.11: Association between assessment of PHYSICAL-SOCIAL among infants of GDM & PIH mothers with respect to socio-demographic variables using chi-square

Demographic variables	PHYSICAL-SOCIAL									
	GDM mothers					PIH mothers				
	Normal		Abnormal		$\chi 2$, p value	Normal		Abnormal		$\chi 2$, p value
	N	%	N	%		N	%	N	%	
Sex										
Male	32	38.1	37	44	1.56, 0.456 NS	33	39.8	39	47	4.56 0.102 NS
Female	77	46.4	64	38.6		90	53.9	58	34.7	
Occupation of the mother										
Employed	11	35.5	13	41.9	4.08 0.665 NS	12	40	16	53.3	7.11, 0.001*
Self-employed	8	36.4	10	45.5		15	53.6	10	35.7	
Daily wages	17	37	21	45.7		18	43.9	20	48.8	
Homemaker	73	48.3	57	37.7		78	51.7	51	33.8	
Mother										
Primigravida	96	43	94	42.2	3.57 0.167 NS	115	50.7	89	39.2	8.34 0.15*
Multigravida	13	48.1	7	25.9		8	34.8	8	34.8	
Family Income										
Below Rs.5000	41	46.1	32	36	11.4 0.022*	48	47.5	44	43.6	3.42 0.489*
Rs.5001 to Rs.10000	38	34.2	52	46.8		54	51.4	38	36.2	
Above Rs.10000	30	60	17	34		21	47.7	15	34.1	

With regard to Fine motor adaptive, significant difference was observed only in gender and monthly income of the family among the infants of both GDM and PIH mothers and other socio-demographic variables are not associated.

V. DISCUSSION

Socio-Demographic variable among infants of the mothers diagnosed as Gestational Diabetes mellitus (GDM) and Pregnancy Induced Hypertension (PIH) were analysed. The highest percentage of Infants was in the age group of 4 months to 6. Both the group I&II comprises of more number of female infants. Majority of GDM mothers' infants (69.2%) were from joint family while most of the PIH mothers' infants (58.8%) were from nuclear family than their respective counterparts. An infant of GDM mothers and PIH mothers were completed only Primary education and seems to be homemaker.Dionne G. et al (2013) stated that perinatal, sociodemographic data, and nonverbal cognitive skills could not account for this discrepancy, and GD effect sizes, although modest, are second only to gender, poverty, and maternal education.

In contrary weight of PIH mothers seems to be increased (84%) whereas among infants of GDM mothers is slightly lesser (63.3%). The table clearly indicates that nutritional status of the infants were affected more by Gestational Diabetes than Pregnancy Induced hypertension.Development (gross motor, language, fine motor adaptive and personal-social) of GDM mother's infants were higher when compared with PIH mother's infants. Therefore, pregnancy induced hypertension is major cause which affects the overall development of infants rather than the growth.

With regard to mentioned socio-demographic variables, the growth of GDM mother infants and PIH mother's infants were similar. Whereas for certain variables like father's education, father's occupation and monthly income, a significant difference was noticed among infants of GDM mothers but not observed among infants of PIH mothers.Among infants of PIH mothers, socio-demographic parameters like gender, father's education and family income seems to be significant with gross motor and language development.

A significant difference was notice among infants of PIH mothers with respect to occupation of the mother, number of times of pregnancy and family income but among GDM mothers, only income of the family was well associated with physical social development of the infants. Lim et al. declared that peripheral systolic blood pressure would decrease birth weight, birth length, head circumference, and placental weight. Similarly Xiong et al and Naeye found that there was no difference in mean birth weight between the various PIH and

normotensive one; however, the mean birth weight was the lowest in severe preeclampsia group.

VI SUMMARY, CONCLUSION, IMPLICATION AND RECOMMENDATION

6.1 Summary

The present study is planned to assess the growth and development among infants of the mothers diagnosed as Gestational Diabetes Mellitus and Pregnancy Induced Hypertension during antenatal period at selected hospitals Puducherry. Quantitative approach with descriptive research design was adopted for this study. Infants of all mothers diagnosed as GDM (N=250) and PIH (N=250) during antenatal period in selected hospitals, Puducherry.

Growth chart,denver development screening test,socio demographic data were evaluated by experts in the field of pediatric department, pediatrician and from nursing department.The suggestions given by experts were incorporated and the tool was finalized. The pilot study results shows the tool was effective in assessing the growth and development of GDM and PIH mothers infants found to be feasible and practicable for conducting the main study.

The results revealed that there was a significant difference among infants of PIH mothers with respect to occupation of the mother, number of times of pregnancy and family income but among GDM mothers, only income of the family was well associated with physical social development of the infants.

6.2 Conclusion

The scenario of gestational diabetes versus pregnancy induced hypertension depicted is on the rise and points out that GDM & PIH are an upcoming maternal health burden and needs urgent attention for its negative and perinatal consequences. The prevalence of GDM is 47.8%, PIH is 48.8% and both GDM and PIH is 3.4% was observed in the present study. Gender, parental education, fathers occupation, income, residence, immunization of infant were found to be the risk factors which affects the growth and development of the infants whose mothers diagnosed as GDM and PIH.

This study strengthens the fact that raising awareness and early detection of diabetes and hypertension is the key to favourable outcomes. It is highly important that women with GDM and PIH be counselled with regard to regular monitoring lifestyle modification and follow-up to prevent the increased risk of developing permanent diabetes and hypertension.

6.3 Implications

The study findings drew various implications to the Nursing Service, Nursing administration, Nursing education and Nursing research.

6.4 Recommendations

- Proper antenatal care and treatment should be given for GDM and PIH mothers.
- Awareness and screening tests be done in earlier stage of pregnancy.

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